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10/707,424	12/12/2003	Thomas D. Barber	20.2876	1423

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EXAMINER	
JONES, DIANE ELIZABETH	
ART UNIT	**PAPER NUMBER**
2862	

DATE MAILED: 10/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/707,424	BARBER, THOMAS D.	
	Examiner	Art Unit	
	Diane E. Jones	2862	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 December 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12 and 17-20* is/are rejected.

7)☒ Claim(s) *13-16 and 21-23* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☒ Other: *See Continuation Sheet*.

Continuation of Attachment(s) 6). Other: dictionary.com, "about" and "resistivity".

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities: The terms $A"_1$, $M"_o$, etc. in Paragraph 0047 and throughout the specification refer to Items A'_1 , M'_0 of Figure 2. The terms must match the items in the drawings.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1 and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Dumanoir (3397356).

3. With respect to Claim 1, Dumanoir discloses a well logging tool (borehole logging apparatus, Col. 2, Lines 44-46 and fig. 1, Items 10 and 11), comprising:

an induction array stack (transmitter and receiver coils, Col. 2, Lines 67-71) disposed on a mandrel (support member portion, Col. 2, Line 67 and Fig. 1, Item 17),

an electronic module stack (cylindrical housing which contains electrical circuits, Col. 2, Lines 54-57 and Fig. 1, Item 18) disposed adjacent the induction array stack along a longitudinal axis of the well logging tool (18 is secured to upper end of 17, Col. 2, Lines 57-60 and Fig. 1, Items 17 and 18) ; and

a shallow electrode array (shallow investigation electrode system, Col. 3, Lines 15-20 and Fig. 1, lower part of 17) arranged on a housing disposed around the electronic module stack (housing 18 for the electronic module stack is a part of the support member 17, the electrodes are around the support member 17, Col. 2, Lines 57-60 and Fig. 1, Items 17, 18, A_1, A_2, A_o, B_1, B_2, M_1, M_2, M_1', M_2'),

wherein the induction array stack comprises a transmitter antenna, a first receiver antenna, and a second receiver antenna spaced apart from each other along the longitudinal axis of the well logging tool (transmitter T_1, receivers R_1 and R_2, Col. 2, Lines 67-71 and Fig. 1, Items T_1, R_1 and R_2), the second receiver antenna being disposed between the transmitter antenna and the first receiver antenna (R_2 is between R_1 and T_1, Fig. 1).

4. With respect to Claim 17, Dumanoir discloses the invention as shown in Claim 1 above, and further teaches that the shallow electrode array and the induction array stack share the electronic module stack (housing which contains electrical circuits for operating the coil and electrode systems, Col. 2, lines 54-60).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dumanoir in view of Barber (4837517).

6. With respect to Claim 2, Dumanoir discloses the invention as shown in Claim 1 above, but lacks the teaching that the induction array stack is no more than 8 feet long.

Barber teaches a well logging tool (electrical induction logging system, Col. 1, Lines 9-12) with a transmitter antenna, first receiver and second receiver (Col. 11, Lines 45-51 and Fig. 9, Items T_1, R_2, and R_1) and which has an induction array stack of 95" or 7.92 feet (Fig. 9, spacing from T_1 to T_2 is 95"). Barber further teaches that this embodiment is built using the principles outlined in the patent (Col. 11, Lines 42-45) which yields a better vertical resolution while retaining the level of depth of penetration of prior tools (Col. 1, Lines 12-15).

It would have been obvious to one skilled in the art at the time of the invention to use the induction array stack of Barber as the transmitter and receiver coils of Dumanoir for the purpose of achieving better vertical resolution.

7. Claims 3-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dumanoir in view of Orban et al. (5905379).

8. With respect to Claim 3, Dumanoir discloses the invention as shown in Claim 1 above, but lacks the teaching that the first receiver antenna is spaced apart from the transmitter at about 45 inches.

Orban et al. teach a well logging tool (induction logging tool with toolstring length shorter than toolstring length in prior art, Col. 2, Lines 10-13) with a transmitter antenna, first receiver and second receiver (transmitter and plurality of cowound receiver and bucking coils, Col. 7, Lines 60-63) where the first receiver antenna is spaced apart from the transmitter antenna at about 45 inches (transmitter to receiver 22c3 is 39 inches, Col. 5, Line 63 shows receiver 12i of Fig. 4 which corresponds to 22c3 of Fig. 6; 39 inches is within 14% of 45 inches, dictionary.com defines "about" to be approximately or nearly, see attached reference, 39 inches is clearly "about" 45 inches).

It would have been obvious to one skilled in the art at the time of the invention to use the transmitter/receiver spacing of Orban et al. in the induction array stack of Dumanoir as this configuration provides a shorter toolstring length.

9. With respect to Claim 4, Dumanoir and Orban et al. disclose the invention as shown in Claim 3 above, and Orban et al. further teach a first bucking coil disposed at a selected location between the transmitter and the first receiver antenna (bucking coil 2e, Col. 8, Line 37 and Fig. 6, Item 2e).

10. With respect to Claim 5, Dumanoir and Orban et al. disclose the invention as shown in Claim 4 above, and Orban et al. further teach that the selected location is about 27 inches from the transmitter antenna (bucking coil 2e is at 27 inches from the transmitter, Col. 8, Line 37 and Fig. 6, Item 2e).

11. With respect to Claim 6, Dumanoir discloses the invention as shown in Claim 1 above, but lacks the teaching that the second receiver antenna is spaced apart from the transmitter at about 22 inches.

Orban et al. teach a well logging tool (induction logging tool with toolstring length shorter than toolstring length in prior art, Col. 2, Lines 10-13) with a transmitter antenna, first receiver and second receiver (transmitter and plurality of cowound receiver and bucking coils, Col. 7, Lines 60-63) where the second receiver antenna is spaced apart from the transmitter antenna at about 22 inches (second receiver 2e is placed 21inches from the transmitter, Col. 8, Line 37 and Fig. 6, Item 2e, 21 inches is within 5% of 22 inches, dictionary.com defines "about" to be approximately or nearly, see attached reference, 21 inches is clearly "about" 22 inches).

12. With respect to Claim 7, Dumanoir and Orban et al. disclose the invention as shown in Claim 6 above, and Orban et al. further teach a second bucking coil disposed at a selected location between the transmitter antenna and the second receiver antenna (bucking coil 2c, Col. 8, Line 27 and Fig. 6, Item 2c).

13. With respect to Claim 8, Dumanoir and Orban et al. disclose the invention as shown in Claim 7 above, and Orban et al. further teach that the selected location is 16 inches from the transmitter antenna (bucking coil 2c is 15 inches from the transmitter, 15 inches is within 6% of 16 inches and is clearly "about" 16 inches).

14. With respect to Claim 9, Dumanoir discloses the invention as shown in Claim 1 above, but lacks the teaching of a third receiver between the transmitter and the second receiver antenna at about 12 inches from the transmitter antenna.

Orban et al. teach a well logging tool (induction logging tool with toolstring length shorter than toolstring length in prior art, Col. 2, Lines 10-13) with a transmitter antenna, first receiver and second receiver (transmitter and plurality of cowound receiver and bucking coils, Col. 7, Lines 60-63). Orban et al. further teach a third receiver between the transmitter and the second receiver antenna at about 12 inches from the transmitter antenna (receiver 2c is 12 inches from the transmitter between the transmitter and the second receiver 2e, Col. 8, Line 27 and Fig. 6, Item 2c).

It would have been obvious to one skilled in the art at the time of the invention to use the transmitter/receiver spacing of Orban et al. in the induction array stack of Dumanoir as this configuration provides a shorter toolstring length.

15. With respect to Claim 10, Dumanoir and Orban et al. disclose the invention as shown in Claim 9 above, and Orban et al. further teach that a third bucking coil is disposed at a selected location between the transmitter antenna and the third receiver antenna (bucking coil 2a is placed between third receiver 2c and transmitter, Col. 8, Line 17 and Fig. 6, Item 2a).

16. With respect to Claim 11, Dumanoir and Orban et al. disclose the invention as shown in Claim 10 above, and Orban et al. further teach that the selected location is 9 inches from the transmitter (third bucking coil 2a is 9 inches from the transmitter, Col. 8, Line 17 and Fig. 6, Item 2a).

17. Claims 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dumanoir in view of Orban et al. (5905379) which incorporates by reference Chandler et al. (5157605).

18. With respect to Claim 19, Dumanoir discloses a method for well logging using a tool comprising:

an induction array stack (transmitter and receiver coils, Col. 2, Lines 67-71) disposed on a mandrel (support member portion, Col. 2, Line 67 and Fig. 1, Item 17),

an electronic module stack (cylindrical housing which contains electrical circuits, Col. 2, Lines 54-57 and Fig. 1, Item 18) disposed adjacent the induction array stack along a longitudinal axis of the well logging tool (18 is secured to upper end of 17, Col. 2, Lines 57-60 and Fig. 1, Items 17 and 18); and

a shallow electrode array (shallow investigation electrode system, Col. 3, Lines 15-20 and Fig. 1, lower part of 17) arranged on a housing disposed around the electronic module stack (housing 18 for the electronic module stack is a part of the support member 17, the electrodes are around the support member 17, Col. 2, Lines 57-60 and Fig. 1, Items 17, 18, A_1, A_2, A_o, B_1, B_2, M_1, M_2, M_1', M_2'),

wherein the induction array stack comprises a transmitter antenna, a first receiver antenna, and a second receiver antenna spaced apart from each other along the longitudinal axis of the well logging tool (transmitter T_1, receivers R_1 and R_2, Col. 2, Lines 67-71 and Fig. 1, Items T_1, R_1 and R_2), the second receiver antenna being disposed between the transmitter antenna and the first receiver antenna (R_2 is between R_1 and T_1, Fig. 1),

the method comprising:

disposing the tool in a well bore (moving the sonde through the borehole, Col. 2, Lines 47-53);

acquiring a first resistivity measurement (deep investigation system yields IL-D resistivity of the formation, Col. 2, Line 68 to Col. 3, Line 8), and a second resistivity

measurement (medium investigation system yields IL-M conductivity of intermediate depth, Col. 3, Lines 9-15, resistivity is the reciprocal of conductivity, see dictionary.com "resistivity");

acquiring a shallow resistivity measurement (shallow investigation electrode system (Col. 3, Lines 15-20) and shallow electrode signal is supplied to amplifier 23, Col. 3, Line 39 and Fig. 1, Item 23),

processing the first resistivity measurement, the second resistivity measurement, and the shallow resistivity measurement to provide a formation resistivity (various measurement signals are transmitted up cable to amplifiers (Col. 3, Lines 34-40) and signals are processed to find resistivites (Col. 3, Line 40 to Col. 6, Line 38), specifically Col. 4, Lines 67-72 for electrode vs. deep induction ratio, Col. 5, Line 40 for medium vs. deep induction ratio, Col. 6, Lines 10 and 25 for electrode results)).

Dumanoir lacks the teaching that the first receiver antenna and the second receiver antenna as applied above give independent resistivity measurements.

Orban et al. teach a folded induction array stack (Col. 2, Lines 15-23 and Fig. 5) which incorporates by reference the Chandler et al. patent to describe the operation of the sensor array (Col. 5, Lines 7-10). Orban et al. further teach that the folded induction array stack has a toolstring length shorter than the toolstring length of the prior art (col. 2, Lines 10-14).

Orban et al. further teach an induction array stack (multi-channel induction sonde, Chandler et al., Col. 2, Lines 50-54) where the induction array stack comprises:

a transmitter antenna, a first receiver antenna, and a second receiver antenna spaced apart from each other along the longitudinal axis of the well logging tool (plurality of receiver arrays coaxially mounted with the transmitter, Chandler et al., Col. 2, Lines 65-67 and Fig. 2), the second receiver antenna being disposed between the transmitter antenna and the first receiver antenna (receiver R3 is between the transmitter and receiver B3, Chandler et al., Col. 4, Lines 54-61),

and a method comprising:

disposing the tool in a well bore (transmitter coil lowered into a borehole, Chandler et al.,Col. 1, Lines 24-29);

acquiring a first resistivity measurement using the first receiver antenna (resistivity measurement Vr and Vx at 20kHz for the coil set 30 and 28, Chandler et al., Col. 4, Lines 42-50 and Figs. 1 and 2),

and a second resistivity measurement using the second receiver antenna (,resistivity measurement Vr and Vx at 20kHz for the coil set 16 and 14, Chandler et al., Col. 4, Lines 42-50 and Figs. 1 and 2),

and processing the first resistivity measurement and the second resistivity measurement to provide a formation resistivity (signals are stored for each measurement and and combined to produce a log of the formation resistivity, Chandler et al., Col. 3, Lines 11-17).

It would have been obvious to one skilled in the art at the time of the invention to use the induction array stack of Orban et al. as the induction array stack of Dumanoir to shorten the toolstring length.

19. With respect to Claim 20, Dumanoir and Orban et al. disclose the invention as shown in Claim 19 above, and Dumanoir further teaches acquiring the shallow resistivity measurement using the shallow electrode array (shallow investigation electrode system (Col. 3, Lines 15-20) and shallow electrode signal is supplied to amplifier 23, Col. 3, Line 39 and Fig. 1, Item 23).

20. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dumanoir as applied to Claim 1 above, and further in view of Barber et al. (4873488).

21. With respect to Claim 12, Dumanoir discloses the invention as shown in Claim 1 above, but lacks the teaching that the mandrel is conductive.

Barber et al. teaches a well logging tool (induction logging sonde, Col. 3, Lines 8-10 and Fig. 1, Item 10) with a transmitter and receiver coils (coil system, Col. 3, Lines 57-64) on a conductive mandrel (tubular metal support of excellent conductivity, Col. 3, Line 66 to Col. 4, Line 1) for the purpose of providing excellent mechanical strength and ruggedness (Col. 2, Lines 23-25).

It would have been obvious to one skilled in the art at the time of the invention to use the conductive mandrel of Barber et al. to provide the mandrel of Dumanoir with excellent mechanical strength and ruggedness.

22. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dumanoir in view of Chemali et al. (GB2019004A).

With respect to Claim 18, Dumanoir discloses the invention as shown in Claim 1 above, but lacks the teaching that an electrode is disposed on the end of the well logging tool.

Chemali et al. teaches a well logging tool (apparatus fro induction logging, Page 1, Lines 3-11) with an induction array stack, an electronic module stack and a shallow electrode array stack (upper and lower parts, Page 3, Lines 57-61) on a mandrel (support member, Page 3, Lines 66-69).

Chemali et al. further teaches an electrode on the end of the well logging tool (electrode A_s on bottom of the sonde, Page 4, Lines 9-13) for the purpose of measuring the spontaneous potential of the earth formation.

It would have been obvious to one skilled in the art at the time of the invention to include an electrode on the bottom of the well logging tool for the purpose of measuring the spontaneous potential of the earth formation.

Allowable Subject Matter

23. Claims 13-16, 21-23 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

24. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. 6711947 B2, 6064210, 3453530 as disclosing inductive/electrode systems; 5668475, 6353321 B1 as disclosing inductive systems; 5585727, 6060886, 4584675, 4583046,3882376, 5396175 as disclosing electrode systems.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Diane E. Jones. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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